

REMARKS/ARGUMENTS

Claims 1-5, 7-19 and 20-25 are pending. Claims 14-16 have been revised as kindly suggested by the Examiner. Claim 8 has been revised to indicate the conventional average molecular weight unit, Da. Claims 20-25 are directed to producing a keratin hydrolysate and track the limitations in the original claims. The hydration and dehydration steps of claim 23 find support in [0017] at the bottom of page 8 of the specification. The alkali compound of claim 24 and the acid/peroxides of claim 25 find support on pages 9-10. Therefore, the Applicants do not believe that any new matter has been introduced. Favorable consideration of this amendment and the remarks below and allowance of this case are respectfully requested.

Objection

Claims 14-16 were objected to as informal. This objection is moot in view of the amendments above.

Rejection—35 U.S.C. §112, second paragraph

Claim 8 was rejected under 35 U.S.C. 112, second paragraph, as being indefinite. This rejection is moot in view of the amendment above.

Rejection—35 U.S.C. §102(b)

Claims 8, 9 and 19 were rejected under 35 U.S.C. §102(b) as being anticipated by Arai, et al., U.S. Patent No. 5,763,583. This rejection does not apply to claim 8, because Arai does not disclose keratin from feathers having an average molecular weight of 8,000 to 13,000 Da. Claims 9 and 19 have been directed to keratin from feathers and so this rejection no longer applies.

Rejection—35 U.S.C. §103(a)

Claims 1-5 and 7-19 were rejected under 35 U.S.C. §103(a) as being unpatentable over Shiojima, et al., U.S. Patent No. 6,066,316, in view of Mullner, et al., WO 0236801 (abstract). This rejection is traversed for the reasons below.

Briefly, Shiojima does not “teach a hydrous state of 20 to 80% or an alkali concentration of 0.1 to 0.5 m/l” (OA, top of page 4). Mullner was applied as a secondary reference teaching a keratinous material “having a water content in the range of 5-99 wt%” for the purpose of eliminating toxic constituents of the final keratin product (OA, top of page 5) but did not provide a reasonable expectation of success for a process using feathers hydrated to contain 20% to 80% water content. Moreover, Mullner is directed to enzymatic hydrolysis not a process of alkaline hydrolysis required by the invention. Thus, Mullner could not have provided a reasonable expectation of success for the superior efficiency of the decomposition rate by alkaline hydrolysis achieved by selection of a keratin raw material having a water content ranging from 20% to 80%, especially as Mullner controls water content for an entirely different purpose, namely in order to arrange dosage form.

Shiojima discloses alkali treatment of hydrated feathers, but it does not provide a reasonable expectation of success for the superior results achieved by selection of a hydrous state for the keratin raw material ranging from 20 to 80% as shown in Table 2. Mullner, being directed to water content ranging from 5-99 wt.%, does not suggest selecting the narrow range required by the claims, nor provide a reasonable expectation of success for improving the decomposition rate by selecting a water content in this range as shown by Table 2 below reproduced from the specification.

[0041]

[Table 2]

Water content (%)	12	20	30	40	50	60	70	80
Decomposition rate (%)	47.5	76.1	79.5	77.5	75.6	78.0	80.0	73.3

As shown above, selection of a water content between 20 and 80% provides a superior decomposition rate compared to a lower water content of 12%.

Furthermore, the keratin produced according to the invention has significantly improved properties, such as decreased undesirable odor as shown by Table 4 on page 19 of the specification (reproduced below):

[0045]

[Table 4]

	Product 6 is superior	Promois WK is superior	Undecided
Color	2	2	16
Smell	12	3	5

[0046]

As clear from the results in Table 4, most panelists smelled less in the solution of the product of the invention (Product 6) as compared with the comparative solution (Promois WK). That is, the solubilized keratin obtained by the method of the invention is substantially decreased in smell as compared with solubilized keratin prepared by conventional process.

Moreover, the tensile strength of hair treated with the keratin produced according to the invention (Product 6) was superior to that of the control (Promois WK) as shown by Table 6 (reproduced below):

[0050]

[Table 6]

	Untreated hair	Bleached hair	Bleached hair + water	Bleached hair + feather keratin (invention)	Bleached hair + wool keratin
Kgf/mm ²	35.95	31.32	30.18	39.18	36.56

Neither prior art document art discloses or suggests the importance of the process steps of the invention and does not provide a reasonable expectation of success for the superior keratin extraction and keratin compositions made by this process.

Table I of the previously-filed Declaration (reproduced below) illustrates the benefits provided by the invention. As shown there, keratin raw material (feathers) hydrated to 50% had a significantly higher decomposition rate than identical features hydrated to 10%.

Table I

Water content (%)	Reaction time (hours)	Decomposition rate (%)
10	6	50.7
10	18	50.3
50	6	79.8
50	18	93.3

Since the table above only provides a single reference point within the hydration range of 20% to 80% required by the claims, the Applicants now provide additional comparative data more commensurate in scope with this range and directly comparable to the 5% to 95% range of Mullner. Table 1 of the new Declaration shows that selection of a hydration range between 20% and 80% surprisingly provides superior hydrolysis as well as increased yield of hydrolysate.

9. Table 1

Water content of feathers	5%	15%	20%	80%	90%	95%
Decomposition rate (%)	46.8	66.4	85.4	83.0	77.8	46.0
The amount of the hydrolysate (%)	1.6	2.2	2.8	2.4	2.0	0.9

This result is surprising because the prior art did not suggest that the degree of hydration was linked to superior hydrolysis, nor suggest optimizing the degree of hydration of the feather raw material to the range 20% to 80%. The increase in decomposition rate reflects the superior hydrolysis of the hydrated raw material and this superior hydrolysis provides a greater yield of keratin. As disclosed in the specification, the more efficient hydrolysis provided by selecting a feather raw material hydrated to 20% to 80% also provides a keratin hydrolysate having less smell and less undesirable coloration.


The prior art, even with the addition of Mullner, provided no motivation for hydrating the keratin raw material (e.g., feathers) to a degree of 20-80% as required by the invention, and could not have provided a reasonable expectation of success for the superior alkaline hydrolysis decomposition process achieved by the invention. Accordingly, this rejection cannot be sustained.

Conclusion

This application presents allowable subject matter and the Examiner is respectfully requested to pass it to issue. The Examiner is kindly invited to contact the undersigned should a further discussion of the issues or claims be helpful.

Respectfully submitted,

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